Applicants traverse the objection to Claim 18. Claim 9 requires plural confinement layers, and active layers, while Claim 18 does not.

The outstanding Office Action asserts that the combination of Hashimoto in view of Ito renders obvious the invention defined by Claim 1. Applicants respectfully traverse this rejection. Claim 1 defines a semiconductor laser device having a semiconductor multi-layer film formed by laminating optical confinement layers and active layers so as to dispose each of the active layers between the optical confinement layers, wherein one of the opposite ends perpendicular to the junction planes of the individual layers in the semiconductor multi-layer film is coated with a low reflection film and the other of the ends is coated with a high reflection film. The low reflection film contains a film comprised of at least Al_2O_3 having a resistivity of 1×10^{12} Ω·m or more.

The invention defined by Claim 1 was not conceived by a random selection of a film having a certain aluminum oxide structure with a particular resistivity, but rather is the product of a technical idea of how to fabricate a semiconductor laser device by considering the evaluation of the resistivity and operation reliability of the device. None of the cited references discuss how the combination of this particular aluminum oxide film with a restriction on resistivity in any way effects the operation reliability of such a device. Rather, it was the observations of the prevent inventors, as discussed in the Amendment filed May 15, 2002, the entire contents of which being incorporated herein by reference, that gave rise to this invention.

Moreover, it was the present inventors who made several technical observations that resulted in the present invention. In particular, with regard to Claim 1, as discussed in the specification at page 5, lines 15-27, the present inventors recognized that by using particular sputtering devices for depositing the Al_2O_3 film a considerably higher resistivity value is

obtained. Use of this particular film, with such a high resistivity, was discovered by the inventors to suppress catastrophic optical damage when the device is operated over a long time, where conventional devices are subject to such catastrophic optical damage when operated over a period of time (e.g. specification, page 5, lines 15-27 and page 2, lines 17-31).

It is the present inventors who identified the novel semiconductor laser device structure through the evaluation of both resistivity and operational reliability. As the technical thought behind the novel device is a result of experimentation by the present inventors, this technical thought enabled them to arrive at the unique idea as presented in the present specification. The present invention is thus backed-up by the findings of the experiments conducted and disclosed in the present specification. Thus, the present inventors have not only described a unique structure that avoids catastrophic optical damage, but also teaches how such a device can be constructed and the result effective variables, that when properly specified, result in superior performance. In no way can it be said that the asserted prior art teaches or even suggests the claimed structure, so as to provide the superior reliability of a semiconductor laser device that employs the present invention.

The outstanding Office Action recognizes in paragraph 3 that Hashimoto discloses nothing but background or conventional structures in relation to the present invention. This has been discussed in detail in the Remarks section of the Amendment filed May 15, 2002. Moreover, and as recognized in the outstanding Office Action, Hashimoto makes no mention of a "resistivity value" as claimed in Claim 1 and does not teach anything that should negate the present inventors' ability to obtain a patent for the presently-claimed invention. The outstanding Office Action asserts Itoh in an attempt to cure the lack of teaching in Hashimoto regarding a low reflection film having a resistivity of 1×10^{12} Ω·m or more. The outstanding

Office Action points to Itoh as disclosing a reflection film having a resistivity of 1×10^{12} Ω·m or more, citing column 7, lines 22-23 of Itoh. However, the "protective layers 20a and 20b" (column 7, lines 31-32), are higher than 10^5 Ω·cm (10^3 Ω·m) or more preferably equal to or higher than 10^9 Ω·cm (10^7 Ω·m) or more. Thus, it appears as though the outstanding Office Action is relying on the open-ended range in Itoh as covering the claimed range.

The undersigned notes that the difference in lower range between Itoh and the presently claimed invention is 10,000 fold (10^{12} Ω·m as compared to 10^7 Ω·m). Even the admitted prior art as discussed in the present specification provides a closer teaching than Itoh, although admittedly is still outside the claimed range of 10^{12} or higher Ω·m. (See e.g. specification, page 14, lines 28-31, referring to a film of 1×10^{11} Ω·m, formed through a conventional sputtering process). Nevertheless, since the outstanding Office Action is relying on Itoh, there is a further need to explain why the "teachings" in Itoh would not in fact teach or suggest to one of ordinary skill in the art to use the features in Itoh in combination with Hashimoto.

The facet protective layers in Itoh are made of GaN semiconductor material (column 6, lines 38-39). Also, however, at column 6, lines 47-58, Itoh explains that "the protective layers 20a and 20b are preferably made of Nitride semiconductor materials in order to establish lattice matching with the Nitride semiconductor crystal layers constituting the semiconductor laser diode. Alternatively, any other material may be used as long as the material can establish lattice matching with the Nitride semiconductor crystal layers containing the semiconductor laser diode and having transparency to the oscillation wavelength of the laser diode." (column 6, lines 47-55). The protective layers referred to in Itoh are limited to "semiconductor layers", as is evident from the condition cited in the above passage that the material of the protective layers is required to establish "lattice matching"

with Nitride semiconductor crystal layers. However, it should be clear that semiconductor layers essentially differ from a dielectric film made of AlO_x, which constitutes an expressly claimed feature of the present invention.

One of ordinary skill in the art would recognize that these different materials have respective different resistive properties. Although Itoh discloses a resistivity range for the GaN semiconductor layer used in the facet protective layer, the disclosed value in no way provides any type of teaching of an optimum resistivity for the AlO_x layer used in the facet protective layer according to the present invention. Moreover, in the present invention the AlO_x layer has a resistivity of 1×10^{12} Ω·m (1×10^{14} Ω·cm) or in the range of 1×10^{12} Ω·m (1×10^{14} Ω·cm) to 1×10^{14} Ω·m (1×10^{16} Ω·cm) in selected dependent claims. In contrast, the facet protective layer in the semiconductor laser of Itoh has a resistivity value of 1×10^{3} Ω·m (1×10^{5} Ω·cm) or more, preferably, 1×10^{7} Ω·m (1×10^{9} Ω·cm) or more. Thus, the resistivity values significantly differ from one another and although Itoh uses open-ended language, there is no teaching or suggestion as to how to enable the creation of the higher resistivity, or even whether the range suggests anything than the conventional range which is limited to 1×10^{11} Ω·m, for use in aluminum oxide material. Accordingly, although similar terms ("protective layer" and "protection film") are used, the two layers (one layer disclosed in Itoh and the aluminum oxide layer claimed in the present invention) essentially differ from one another.

Moreover, Itoh merely mentions an exemplary resistivity value for the facet protective layer made of a GaN semiconductor material and does not even suggest the present invention, which relates to an aluminum oxide material. Consequently, it is respectfully submitted that Itoh does not negate the patentability of the present invention whether taken in combination

with Hashimoto, or in isolation. Consequently, it is respectfully submitted that Claims 1-2, 6-8, 17 and 19 patentably define of Hashimoto in view of Itoh.

As discussed in the Amendment filed May 15, 2002, the invention defined by Claim 9 contains selected features about the Al_2O_3 film that are absent from Hashimoto, and are also not disclosed in Itoh. Accordingly, it is respectfully submitted that the outstanding Office Action has not created a *prima facie* case of obviousness with regard to independent Claim 9 or Claims 10 and 14-17 which depend therefrom.

The outstanding Office Action rejects Claims 3-5 and 11-13 as being unpatentable over Hashimoto in view of Itoh and in further view of Chand et al. Chand is asserted for its disclosure of a desired reflectivity that can be combined with one or more layers of other dielectric or semiconductor materials. However, as noted above, Chand is not believed to teach any of the attributes discussed above that are absent in both Hashimoto and Itoh with regard to independent Claims 1 and 9. Accordingly, it is respectfully submitted that no matter how Hashimoto, Itoh and Chand are combined, the combination does not teach or suggest the invention defined by Claims 3-5 or 11-13.

More particularly, it should be stated that when faced with actually having to fabricate semiconductor laser devices using different materials, different techniques must be required depending on the material used. For example, it is well known in the art that specialized fabrication techniques are required for GaN semiconductor laser devices as shown in Itoh, which would not provide a teaching or suggestion for use in other devices that would use the aluminum nitride films for example. Thus, it is respectfully submitted that none of Hashimoto, Itoh or Chand teach or suggest a combination of the different techniques associated with the different types of semiconductor laser devices. Accordingly, it is respectfully submitted (as required by In re Lee) that there is no teaching, suggestion or any

evidence that one of ordinary skill in the art would have had any motivation for combining the techniques disclosed in the cited references to arrive at the presently claimed invention. On the other hand, Applicants have provided substantial evidence that the asserted prior art would not constitute a "teaching" or even a "motivation" for combining the disparate techniques disclosed in these different references. As cautioned by the Federal Circuit in In re Lee, it appears as though the present rejection is based on an untaught putting together different fabrication techniques to arrive at a semiconductor laser that corresponds with the claimed invention. However, such combination of components would in no way have been clear or rational unless the hypothetical person of ordinary skill in the art had the benefit of the experiments performed by the present inventors based on the technical idea disclosed in the present specification.

Consequently, in view of the present amendment and in light of the foregoing comments, it is respectfully submitted that the invention defined by Claims 1-19 is patentably distinguishing over the prior art. The present application is therefore believed to be in

condition for formal allowance and an early and favorable reconsideration of this application is therefore requested.

Respectfully submitted,

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